SECTION 2. PROBLEMS AND OPPORTUNITIES

2.1 EXISTING CONDITIONS

The Rippowam River Watershed encompasses 37.5 square miles. The lower 8-mile reach of the Rippowam from the North Stamford Reservoir to Long Island Sound is known as the Mill River. The project area consists of a 2.5-mile length of the Mill River from Cold Spring Road downstream to the West Branch of Stamford Harbor. The study area includes the Mill Pond, an impounded reach of river, and Main Street dam, which creates the impoundment and is located approximately 500 feet upstream of Main Street Bridge. The study area also includes Mill River Park, a six-acre park that surrounds Mill Pond (Plate 1).

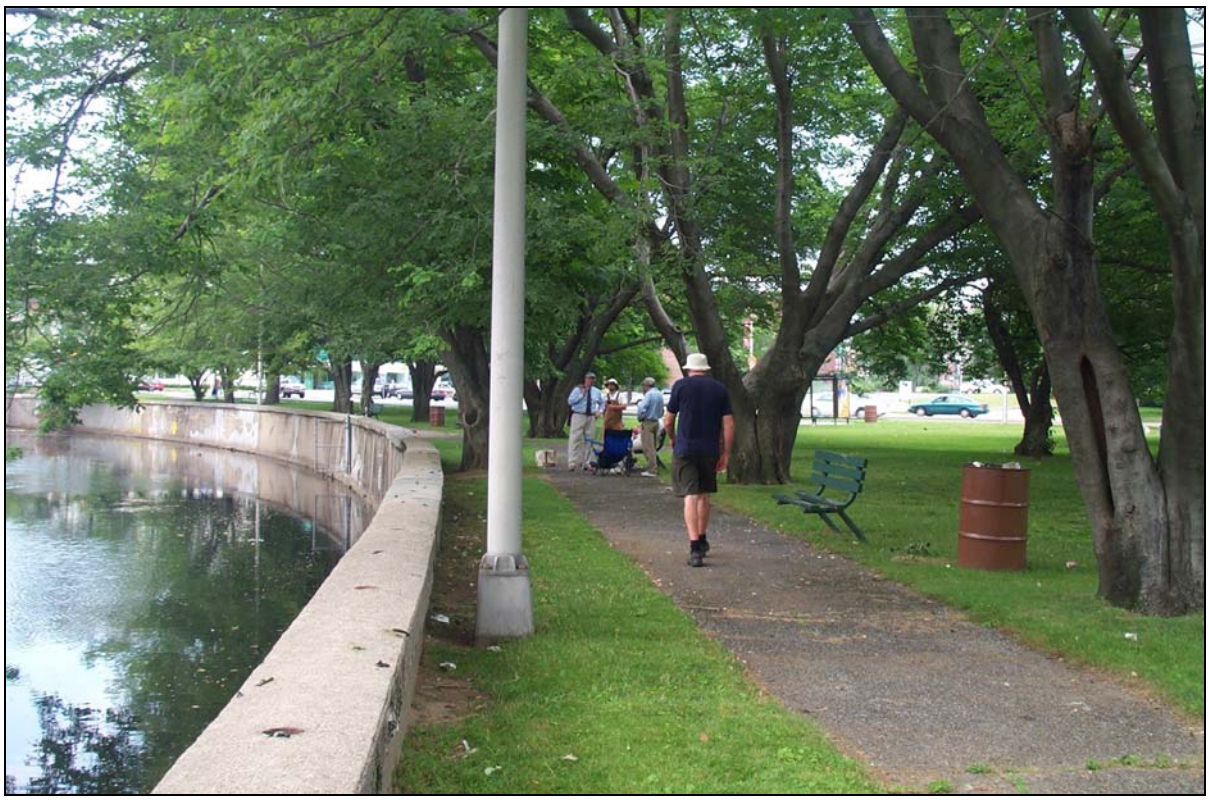


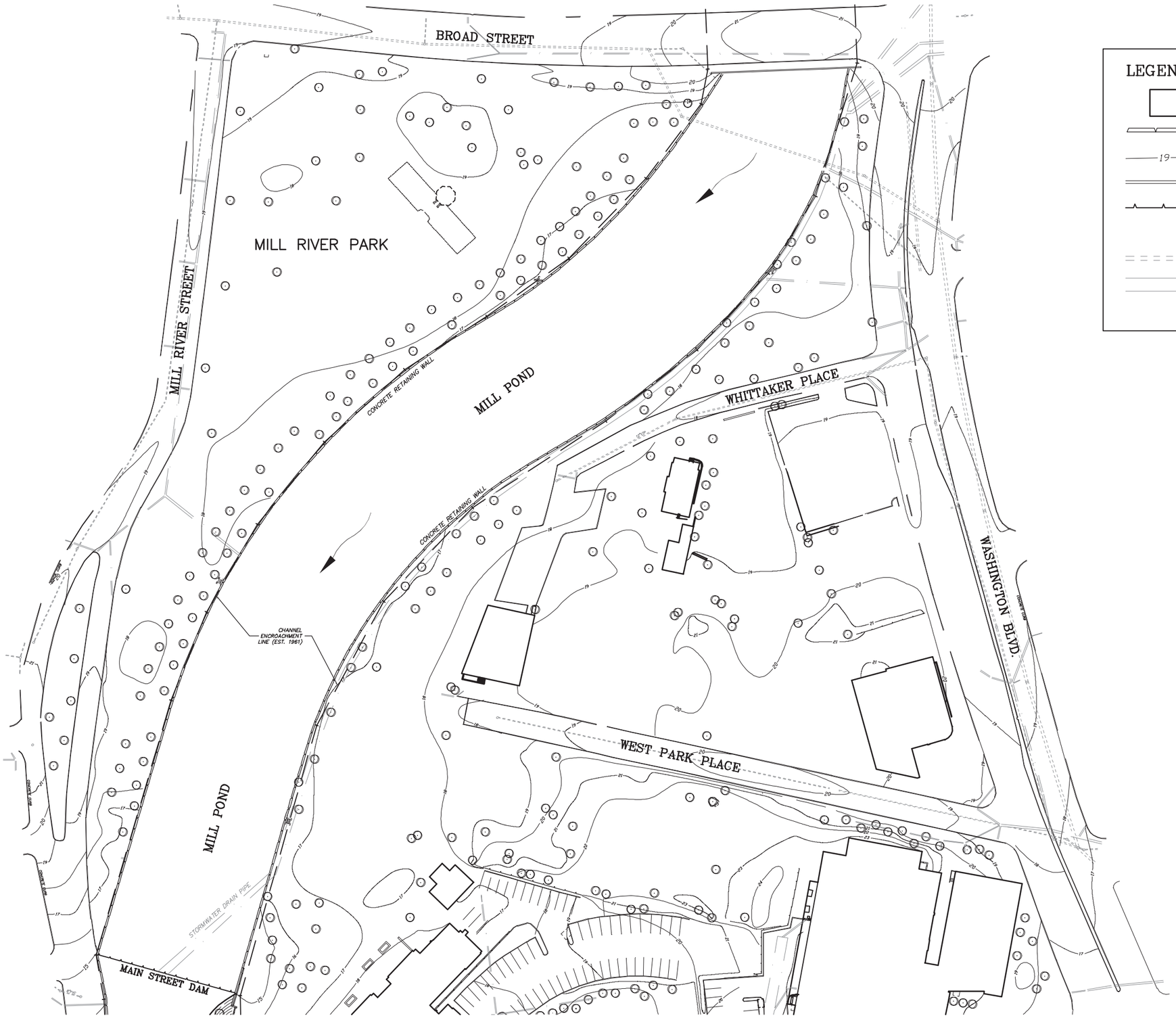
Plate 1. Mill Pond and Mill River Park

The river through the study area varies in width from approximately 40 feet from bank to bank upstream of Broad Street, to 126 feet from bank to bank at the mouth of the West Branch of Stamford Harbor. The river is estuarine south of the Tresser Bridge and tidal to the base of the Main Street Dam with a mean high water at 4.26 feet (NGVD 29). The river flows more swiftly in the upper reaches and is characterized by a narrower width at bankfull stage. The channel bed in the upper reaches is scoured and armored with gravel, cobble, and boulders. Downstream of the Main Street Dam, the Mill River flows slowly

toward the river mouth in Stamford Harbor. In this lower reach, sediment deposition occurs and a short tidal shelf extends to the floodplain. The lower reach of the Rippowam Watershed is primarily urbanized, with residential areas, urban parks, commercial buildings, parking lots, and some bordering woodlands. The urban landscape often infringes directly upon the riparian buffer (FEMA 1993). The watershed surface is becoming increasingly impervious, which has caused a change in the hydrologic regime and channel morphology.

Restoration efforts are focused on rehabilitation of Mill Pond located behind the Main Street Dam (Plate 2). The concrete dam is 9.3 feet high and the impoundment behind it is defined by 15-foot high concrete floodwalls (Figure 4). The pond extends from the dam upstream to the Broad Street Bridge.
Water movement through the pond is slow, allowing sediments to fall out of suspension, creating a bed of sediments, which would require dredging every few years to maintain a pool in the impoundment. The bed is primarily unconsolidated, filled with trash, choked by aquatic plants, and is at times malodorous. Resident Canada geese flock in large numbers to the pond and adjacent park, compounding pollution issues. The pond bisects Mill River Park and separates downtown Stamford from residential neighborhoods. Mill River Park consists of a lawn with mature urban trees located directly adjacent to the pond's retaining walls.

Plate 2. Main Street Dam



LEGEND – KEY EXISTING FEATURES

- BUILDINGS
- CONCRETE RETAINING WALL
- CONTOURS (19)
- CURBS
- DAM
- MANHOLE
- SANITARY SEWER PIPE
- STORM SEWER PIPE
- TREES

NORTH

GRAPHIC SCALE 100 0 50 SCALE IN FEET

CURRENT CONDITIONS AT MILL RIVER PARK STAMFORD, CONNECTICUT

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FIGURE 4 EXISTING SITE PLAN AND TOPOGRAPHIC SURVEY OF THE MILL RIVER PARK

2.2 PROBLEM IDENTIFICATION

The reconstruction of the Main Street Dam in 1922 continued the obstruction of passage for anadromous fish to upstream spawning grounds. The dam also prohibits estuarine species from foraging beyond the tidal reach. Energy flows and sediment passage are arrested at the Main Street Dam, which forms an impoundment that holds sediment and concentrates nutrients and pollutants. The pond is undergoing eutrophication, with excessive nutrient loads exacerbated by the large population of Canada geese. Low oxygen levels created by excessive levels of decaying organic matter combined with sedimentation have created a highly degraded habitat within Mill Pond.

The Main Street Dam is currently in need of repairs (Plate 3) and any construction associated with the dam or pond would require extensive modifications to ensure the stability and function of the dam. As mentioned in Section 1, conceptual plans were developed for an Alaskan steep pass fish ladder for Main Street Dam to partially restore fish passage. Those plans include a requirement for the city of Stamford to perform repairs to the dam structure prior to fish ladder installation. The fish ladder measure has been further investigated in this study and included in Alternative 4 of this study. Dam repair would continue to be required for this fish-ladder alternative. Reinforced concrete walls that confine the pond on all sides are also in need of repair (Plate 4).

Plate 3. Failing sluice gate of the Main Street dam

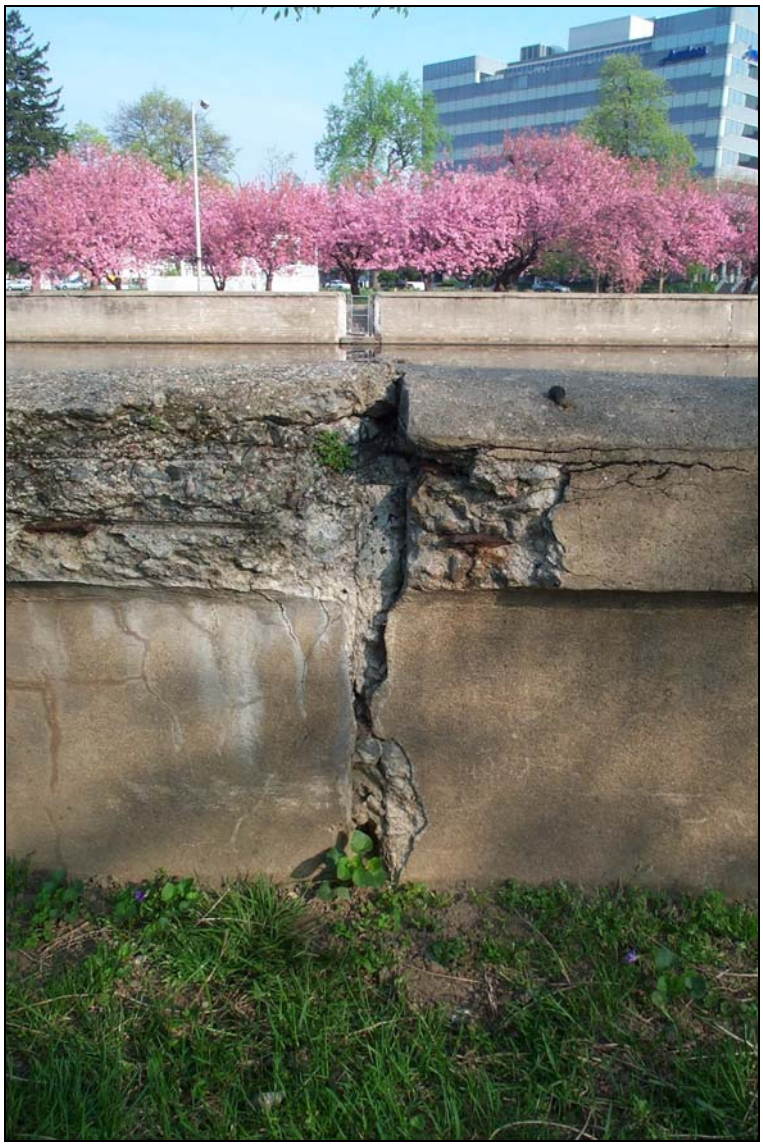

Plate 4. Cracked retaining wall of the Mill Pond impoundment

Bordering the pond, Mill River Park is equally in need of attention. The riverbanks provide minimal riparian habitat value. Existing vegetation comprises mature ornamental trees, turf grasses, and invasive weeds encroaching from neighboring lots. A double row of exotic cherry trees, which were gifted to the city and planted in 1957, provide exceptional color in the spring (Plate 5). However, they are nearing the end of their lifespan and show evidence of disease and other damages (Appendix I). The park is inhabited by urban-adapted animals, such as rodents, starlings, sparrows, and Canada geese.

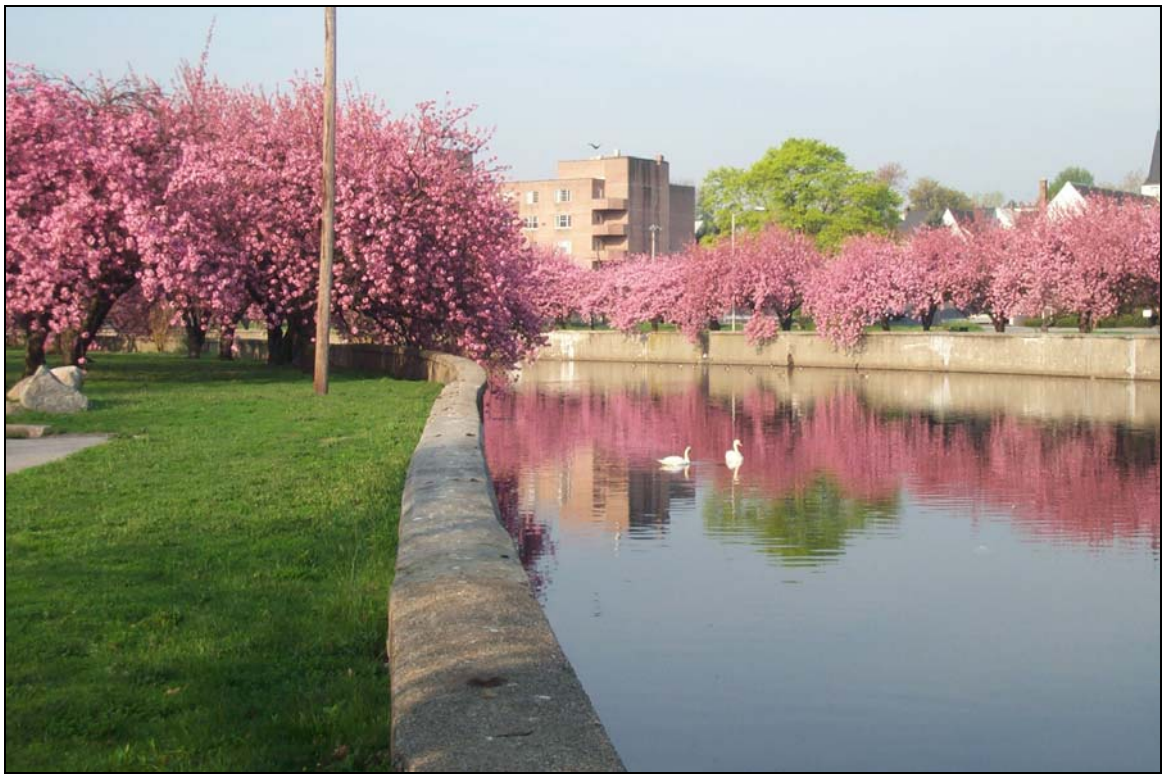

Plate 5. Mill River Park with cherry trees in full bloom

Only a short walk to downtown Stamford, this urban open space lacks physical access to the river and pedestrian connections downstream and between banks. There are no visual or physical links to Stamford's center, the University of Connecticut, surrounding residences and retail establishments, or other reaches of the river.

Anadromous fish passage and movement of other aquatic species up and down the river are further restricted by a large concrete block and an abandoned gate structure that are located in the river under the Pulaski Street Bridge, in the intertidal reach of the river. This structure is currently blocking fish from movement upstream during low and intermediate tide levels.

Some reaches of the Mill River have retained their natural banks, floodplain, and riparian buffer. However, the riparian buffers are frequently encroached upon and in some cases, residential backyards, parking lots, and buildings are at the very edge of banks. Impervious surfaces funnel stormwater into culverts, which enter directly, untreated, into Mill River. This modified hydrology leads to frequent high flows containing pollutant traces and sediment from roadways and buildings. Flooding becomes more frequent due

to increased volumes associated with storm events that lead to high energy flows and corresponding erosive forces, which erode the channel bed and banks, remove bank-side and emergent vegetation, and threaten property.

The spread of exotic plant species threatens habitat value and biodiversity on the Mill River. Norway maple and tree-of-heaven out-compete native floodplain species and limit the diversity of stream bank canopy species. The woody perennial Japanese knotweed is spreading rapidly and is extremely difficult to remove once established. Knotweed grows rapidly, shading out existing stream bank vegetation and propagating vegetatively along the bank. A piece of rhizome only 1 inch long can float downstream and then establish, colonize, and completely dominate a riverbank (Seiger 1991). Additionally, in the tidal reach of the river, two floodplain benches contain a dominance of *Phragmites*, an invasive species.

The 2.5-mile corridor of Mill River currently lacks freshwater wetlands. Most of the wetlands that once existed in this lower reach were drained or filled in for development.

If the Main Street Dam and pond were to remain in place, then the dam would continue to be a liability for the city of Stamford, requiring repairs and necessitating regular dredging in the impoundment behind it. If the dam remains in place, and no accommodations for fish passage made, the dam would continue to block upstream fish movement and prevent successful re-introduction of anadromous fish to Mill River and the Rippowam Basin. Fish passage is additionally blocked at low tide by the Pulaski Street Bridge obstruction. Mill Pond would continue to exist as a concrete-lined urban pond with little to no depth and a lack of riparian habitat.

The cherry trees in Mill River Park are a concern for aesthetics as well as safety as boughs and whole trees begin to die from disease and old age (Plate 6). The cherry trees will require replacement if they are to be retained alongside the floodwalls. Terrestrial habitat is poor and will not maintain itself, requiring ongoing maintenance of exotic, ornamental, and lawn areas. The unsightly nature of the pond and the lack of connection to surrounding areas will discourage use by Stamford residents.

Plate 6. Damaged cherry tree in Mill River Park

Without restoration, the riparian corridor of the river will continue to be dominated by invasive species such as Japanese knotweed and *Phragmites*. Such species may continue to spread to other reaches and displace native riparian vegetation. As the population and density of the Stamford population grows (Office of Policy and Management, State of Connecticut), the percentage of impervious surface in the watershed will also increase. If riparian buffers are not augmented, and if the absence of upstream wetlands is not mitigated, then the river will continue to receive ever-increasing quantities of stormwater that is loaded with increasing amounts of sediment and pollutants.

2.3 ECOSYSTEM RESTORATION OPPORTUNITIES

Given the various issues present along the Mill River, many opportunities exist for aquatic ecosystem restoration and protection. The following restoration opportunities have been identified for the site:

- Improve in-stream aquatic habitat
- Restore riparian habitat
- Restore wetland habitat
- Abate impact of stormwater runoff
- Preserve and protect existing high quality habitat
- Enhance self-maintenance and sustainability

2.4 PROJECT GOAL AND OBJECTIVES

The project goal and objectives were defined based on addressing the identified problems and opportunities within the study area.

2.4.1 Project Goal

The goal of the Mill River and Mill Pond habitat restoration is to restore the river's aquatic and riparian resources and return the Mill River to a healthy, viable, and self-maintaining river system.

2.4.2 Project Objectives

The objectives of the proposed project are as follows:

- Restore instream and riparian habitat within the 2.5-mile reach in the city limits
- Restore anadromous fish passage to the upper reaches of Mill River
- Improve aquatic diversity and health in Mill River
- Reduce sedimentation
- Restore water quality to support fisheries
- Restore wetland habitat
- Improve recreational access and opportunities along the river corridor that help protect the restored habitat and provide interpretive opportunities

2.5 CONSTRAINTS

The following constraints have been identified for the Mill River study:

- Avoid adverse socioeconomic impacts
- Avoid hazardous, toxic, and radioactive waste sites
- Avoid adverse impacts to cultural and historic sites
- Avoid adverse impacts to rare, threatened, or endangered species